Supplementary Figure Legends

Supplementary Fig. S1: Ultra-Localized Lysis. (A) and (B) are merged brightfield and PI fluorescence images. (A) Shows a grouping of 3 cells above the central nanoribbon device. Only one of these cells (red arrow) is directly above the nanoribbon. (B) After lysis, only the cell that was directly above the device shows a PI fluorescence increase. This implies the lysis of cells is very highly localized to within nanometers of the device surface. Scale bars for (A) and (B) are 40 μm

Supplementary Fig. S2: FRET Construct Melting. A plot of fluorescence increase observed from a 72 °C dsDNA FRET construct denaturing with applied voltage. At the voltages used for irreversible electroporation, 600-900mV_{pp}, no fluorescence increase is observed. This implies that heating is not the likely cause of cell lysis.

Supplementary Fig. S3: Current-Voltage Transistor Characterization Before and After Signal Application. The leakage current from the drain to the bulk (Idb) remains below 10^{-9} A before and after cell lysis. The drain-source current (Ids) retains typically transistor characteristics before and after signal application.

Supplementary Video SV1: A video of an HT-29 cell being positioned above a group of nanowires using the magnetic trapping system.

Supplementary Table 1: Constants for Transmembrane Potential Calculations

Supplementary Information References

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3. A. P. Mazzoleni, B. F. Sisken and R. L. Kahler, *Bioelectromagnetics*, 1986, **7**, 95-99.